Lesson 3.1 • Recursive Sequences

Name _____ Period _____ Date _____

1. Evaluate the expression $\frac{2(3x + 1)}{-4}$ for each value of x.

a. $x = 9$ **b.** $x = 2$ **c.** $x = -1$ **d.** $x = 14$

2. Consider the sequence of figures made from triangles.

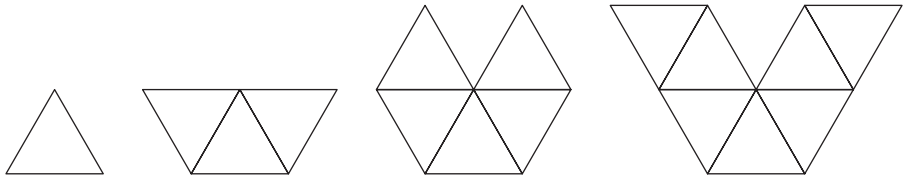


Figure 1 Figure 2 Figure 3 Figure 4

Figure #	Perimeter
1	3
2	5
3	
4	
5	

a. Complete the table for five figures.

b. Write a recursive routine to find the perimeter of each figure.

c. Find the perimeter of Figure 10.

d. Which figure has a perimeter of 51?

3. List the first six values generated by the following recursive routine:

-27.4 ENTER

Ans $+$ 9.2 ENTER, ENTER, . . .

4. Write a recursive routine to generate each sequence. Then use your routine to find the 10th term of your sequence.

a. 7.8, 3.6, -0.6, -4.8, . . . **b.** -9.2, -6.5, -3.8, -1.1, . . .

c. 1, 3, 9, 27, . . . **d.** 36, 12, 4, $1.\overline{3}$, . . .

5. Ben's school is $\frac{3}{4}$ mile, or 3960 feet, away from his house. At 3:00, Ben walks straight home at 330 feet per minute.

a. On your calculator, enter a recursive routine that calculates how far Ben is from home each minute after 3:00.

b. How far is he from home at 3:05?

c. At what time does Ben arrive home?

Lesson 3.2 • Linear Plots

Name _____ **Period** _____ **Date** _____

1. Solve each equation.

a. $8(x - 3) - 9 = -25$

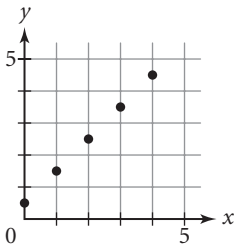
b. $16 - 5(x - 4) = 46$

c. $\dfrac{37 - 2(x + 8)}{4} = 4$

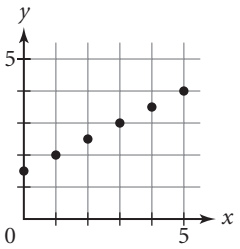
d. $\dfrac{-3(x - 9) + 4}{-4} = -10$

2. List the terms of each number sequence of y-coordinates for the points shown on each graph. Then write a recursive routine for each sequence.

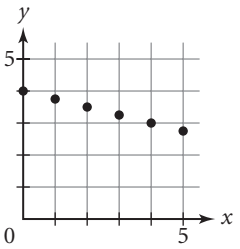
a.



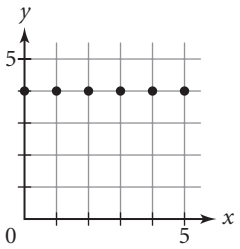
b.



c.



d.



3. Plot the first five points represented by each recursive routine on separate graphs.

a. {0, 4} ENTER
{Ans(1) + 1, Ans(2) + 3} ENTER, ENTER, . . .

b. {2, 6} ENTER
{Ans(1) + 1, Ans(2) − 0.25} ENTER, ENTER, . . .

c. {4, −1} ENTER
{Ans(1) + 1, Ans(2) − 2} ENTER, ENTER, . . .

4. Consider the following expression:

$$\frac{4(x - 5) - 8}{-3}$$

a. Use the order of operations to find the value of the expression if $x = 1$ and if $x = 8$.

b. Set the expression equal to 12. Create an undoing table and solve by undoing the order of operations you used in 4a.

5. One hundred metersticks are used to outline a rectangle. Write a recursive routine that generates a sequence of ordered pairs (l, w) that lists all possible rectangles.

Lesson 3.3 • Time-Distance Relationships

Name _____ Period _____ Date _____

1. Consider the following tables:

a.

Time (s)	Distance (m)
0	1.2
1	1.7
2	2.2
3	2.7
4	3.2
5	3.7

b.

Time (s)	Distance (m)
0	8
1	6.8
2	5.6
3	4.4
4	3.2
5	2.0

i. Describe the walk shown in each table. Include where the walker started and how quickly and in what direction the walker moved.

ii. Write a recursive routine for each table.

2. Walker A starts at the 0.5 m mark and walks away from the sensor at a constant rate of 1.7 m/s for 6 s. Walker B starts at the 4 m mark and walks toward the sensor at a constant rate of 0.3 m/s for 6 s.

a. Make a table of values for each walker.

b. Write a recursive calculator routine for each walk and use it to check your table entries.

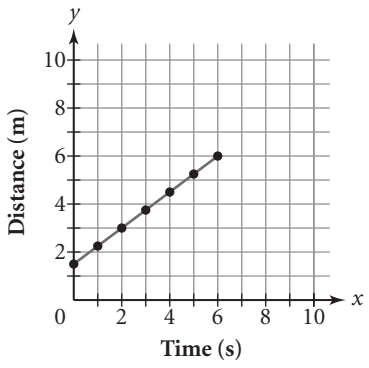
3. Look at the tables in 1a and b. Assume that both walkers start at the same time and are walking along the same route.

a. Make one graph showing both walks.

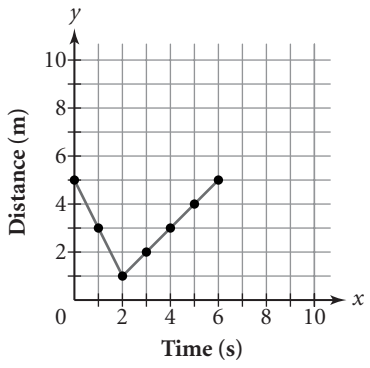
b. What do you notice about the two lines? Explain the significance of your observation.

4. Describe the walk shown in each graph. Include where the walker started, how quickly and in what direction the walker moved, and how long the walk lasted. The units for x are seconds and for y are meters.

a.



b.



Lesson 3.4 • Linear Equations and the Intercept Form

Name _____ Period _____ Date _____

1. Match the answer routine in the first column with the equation in the second column.

a. 2 ENTER
Ans − 0.75 ENTER, ENTER, . . .

b. 0.75 ENTER
Ans + 2 ENTER, ENTER, . . .

c. −0.75 ENTER
Ans − 2 ENTER, ENTER, . . .

d. −2 ENTER
Ans + 0.75 ENTER, ENTER, . . .

i. $y = -2 + 0.75x$

ii. $y = 2 - 0.75x$

iii. $y = -0.75 - 2x$

iv. $y = 0.75 + 2x$

2. A store could use the equation $P = 6.75 + 1.20w$ to calculate the price P it charges to mail merchandise that weighs w lb. (1 lb = 16 oz)

a. Find the price of mailing a 3 lb package.

b. Find the cost of mailing a 9 lb 8 oz package.

c. What is the real-world meaning of 6.75?

d. What is the real-world meaning of 1.20?

e. A customer sent $20.00 to the store to cover the cost of mailing. He received the merchandise plus $6.65 change. How much did his parcel weigh?

3. You can use the equation $d = -10 + 3t$ to model a walk in which the distance d is measured in miles and the time t is measured in hours. Graph the equation and use the trace function to find the approximate distance for each time value given in 3a and b.

a. $t = 2.2$ h

b. $t = 4$ h

c. What is the real-world meaning of −10?

d. What is the real-world meaning of 3?

4. Undo the order of operations to find the x-value in each equation.

a. $9 - 0.75(x + 8) - 5 = -2$

b. $\dfrac{15 - 8(x - 6)}{4} = -2.25$

5. The equation $y = 115 + 60x$ gives the distance in miles that a trucker is from Flint after x hours.

a. How far is the trucker from Flint after 2 hours and 15 minutes?

b. How long will it take until the trucker is 410 miles from Flint? Give the answer in hours and minutes.

Lesson 3.5 • Linear Equations and Rate of Change

Name _____ Period _____ Date _____

1. Complete the table of output values for each equation.

a. $y = 24 - 3x$

Input x	2	11	−1	7.5	9.4
Output y					

b. $L2 = 8 - 0.75 \cdot L1$

Input list L1	4	12	0.8	$-0.\overline{3}$	36
Output list L2					

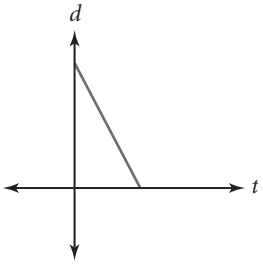
2. Use the equation $d = 1032 - 210t$ to approximate the distance in miles and time in hours of a pilot from her destination.

a. Find the distance d for $t = 4.8$ h.

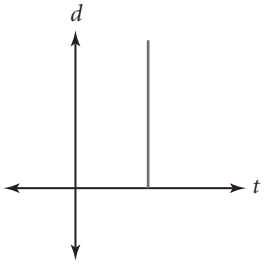
b. Find the time t for a distance of 770 mi.

3. Tell whether each graph is a possible model for a person's distance from a tree. If it is a possible model, describe the rate of change shown in the graph. If it is not a possible model, explain why not.

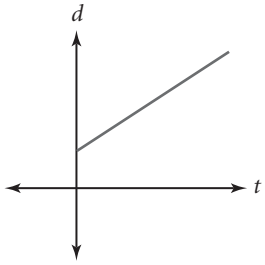
a.



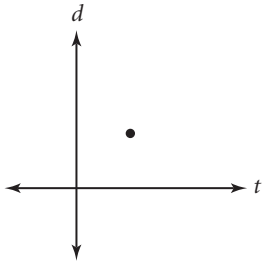
b.



c.



d.



4. Each table shows a different input-output relationship.

i.

Input	Output
2	7
3	9
4	11
5	13
6	15

ii.

Input	Output
−5	22
−2	10
1	−2
4	−14
7	−26

iii.

Input	Output
−8	4
−3	−1
2	−6
7	−11
12	−16

a. Find the rate of change, or slope, for each table.

b. For each table, find the output value that corresponds to an input value of 0. What is this output value called?

c. Use your results from 4a and b to write an equation in slope–intercept form for each table.

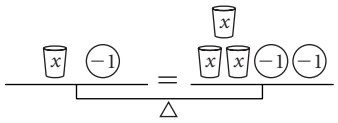
d. Use calculator lists to verify that your equations actually produce the table values.

Lesson 3.6 • Solving Equations Using the Balancing Method

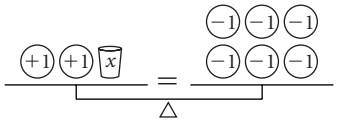
Name _____ Period _____ Date _____

1. Give the equation that each picture models and solve for x.

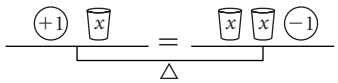
a.



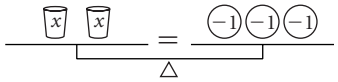
b.



c.



d.



2. Write each equation in intercept form, $y = a + bx$.

a. $y - 4 = 2x + 1$ **b.** $y + 9 = 4x + 2$ **c.** $\frac{3}{4}x - 6 = 11 - y$

3. Solve each equation using the balancing method. Give the action taken for each step.

a. $5 = 2a + 1$ **b.** $5b - 4 = -20$ **c.** $6 + c = 3c - 10$

4. Give the multiplicative inverse of each number.

a. 7 **b.** 0.25 **c.** $-\frac{5}{8}$ **d.** -36

5. Give the additive inverse of each number.

a. 0.25 **b.** $-\frac{5}{8}$ **c.** -36 **d.** $2z$

6. Solve each equation using the method of your choice. Then use another method to verify your answer.

a. $-12 = 9w - 30$ **b.** $8 - 3v = -1$

c. $\frac{3}{4}m = -9$ **d.** $-\frac{5}{2}n = -4$

e. $4\,(x + 3.2) + 2.1 = 16$ **f.** $\frac{-4 + 2(3 - y)}{5} - 8.4 = 0$

d. $2 - 3 - (4 + 1) = -6$

e. $4 - 5 + 2 - (6 - 11) = 6$

f. $4 - (5 + 2) - (6 - 11) = 2$

3. Some answers may vary; sample answers are given.

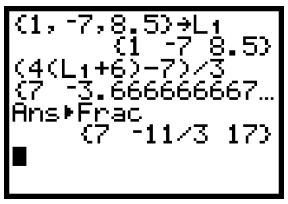
a. $-(2^3 - 9) = 1$ **b.** $-(6 - 3^2) = 3$

c. $4^2 - (2 - 5) = 19$ **d.** $-(2^5 - 8 \cdot 3) = -8$

e. $12 - (3 + 1)^2 = -4$ **f.** $3^2 - (-2 + 7) = 4$

4. a. $7, -\frac{11}{3}, 17$ **b.** $\frac{4(x + 6) - 7}{3}$

c. Calculator technique may vary. A sample answer is:



5. a. Multiply a starting number by 4 and add 6, then divide by 2, then subtract twice the starting number, and finally add 14.

b. 17

c. Yes, it is a number trick. If you pick other starting numbers, the value of the expression is always 17. The trick works because when 4 times the starting number plus 6 is divided by 2, the result is 2 times the starting number plus 3. Subtracting twice the starting number and adding 14 leaves just 3 + 14. It may help to draw a diagram showing the steps.

LESSON 2.8 • Undoing Operations

1. a. 7 **b.** −7 **c.** −10 **d.** 30

e. −8 **f.** 2 **g.** −5 **h.** −10.2

i. 7

2. a. 4 **b.** −25 **c.** 6 **d.** 0

3. a.

		$x = 100$
/ (5)	· (5)	20
− (8)	+ (8)	12

b.

		$x = 3$
· (6)	/ (6)	18
− (7)	+ (7)	11

c.

		$x = -5$
− (4)	+ (4)	−9
/ (9)	· (9)	−1

d.

		$x = -2$
+ (0.5)	− (0.5)	−1.5
· (−18)	/ (−18)	27

4. a. $K = \frac{(F - 32)}{1.8} + 273$ **b.** 310 K

c. $0 = \frac{(F - 32)}{1.8} + 273$

$-273 = \frac{(F - 32)}{1.8}$

$-491.4 = F - 32$

$-459.4 = F$

Absolute zero is −459.4°F.

5. a. Equation: $\frac{2(x + 1.5)}{5} - 8.2 = -9.1$

Description	Undo	Result
Pick x.		− 3.75
+ (1.5)	− (1.5)	− 2.25
· (2)	/ (2)	− 4.5
/ (5)	· (5)	− 0.9
− (8.2)	+ (8.2)	− 9.1

$x = -3.75$

b. Equation: $9\frac{1}{2} - 5(x - 3) = 18\frac{1}{4}$ or $9\frac{1}{2} + (-5)(x - 3) = 18\frac{1}{4}$

Description	Undo	Result
Pick x.		$1\frac{1}{4}$
− (3)	+ (3)	$-1\frac{3}{4}$
· (−5)	/ (−5)	$8\frac{3}{4}$
$+\left(9\frac{1}{2}\right)$	$-\left(9\frac{1}{2}\right)$	$18\frac{1}{4}$

$x = 1\frac{1}{4}$

LESSON 3.1 • Recursive Sequences

1. a. −14

b. −3.5

c. 1

d. −21.5

2. a.

Figure #	Perimeter
1	3
2	5
3	7
4	9
5	11

b. 3 ENTER

Ans + 2 ENTER, ENTER, . . .

c. 21 **d.** Figure 25

3. {−27.4, −18.2, −9, 0.2, 9.4, 18.6}

4. a. Start with 7.8, then apply the rule Ans − 4.2; −30.

b. Start with −9.2, then apply the rule Ans + 2.7; 15.1.

c. Start with 1, then apply the rule Ans · 3; 19,683.

d. Start with 36, then apply the rule Ans ÷ 3; $\frac{4}{2187} \approx 0.001829$.

5.

a.

```
3960
                3960
Ans-330
                3630
                3300
                2970
                2640
```

b. 2310 ft

c. at 3:12

LESSON 3.2 • Linear Plots

1. a. $x = 1$ **b.** $x = -2$ **c.** $x = 2.5$ **d.** $x = -3$

2. a. 0.5, 1.5, 2.5, 3.5, 4.5

0.5 [ENTER]; Ans + 1 [ENTER], [ENTER], . . .

b. 1.5, 2, 2.5, 3, 3.5, 4

1.5 [ENTER]; Ans + 0.5 [ENTER], [ENTER], . . .

c. 4, 3.75, 3.5, 3.25, 3, 2.75

4 [ENTER]; Ans − 0.25 [ENTER], [ENTER], . . .

d. 4, 4, 4, 4, 4, 4

4 [ENTER]; Ans + 0 [ENTER], [ENTER], . . .

3. a. Graph should include (0, 4), (1, 7), (2, 10), (3, 13), and (4, 16).

b. Graph should include (2, 6), (3, 5.75), (4, 5.50), (5, 5.25), and (6, 5).

c. Graph should include (4, −1), (5, −3), (6, −5), (7, −7), and (8, −9).

4. a. 8; $-\frac{4}{3}$

b.

		$x = -2$
− (5)	+ (5)	−7
· (4)	/ (4)	−28
− (8)	+ (8)	−36
/ (−3)	· (−3)	12

5. {49, 1} [ENTER]

{Ans(1) − 1, Ans(2) + 1} [ENTER]; [ENTER], . . .

LESSON 3.3 • Time-Distance Relationships

1. a. i. The walker started 1.2 m from the sensor and walked away from the sensor at 0.5 m/s.

a. ii.

```
{0,1.2}
                {0 1.2}
{Ans(1)+1,Ans(2)
+0.5}
                {1 1.7}
                {2 2.2}
                {3 2.7}
```

b. i. The walker started 8 m from the sensor and walked toward the sensor at 1.2 m/s.

b. ii.

```
{0,8}
                {0 8}
{Ans(1)+1,Ans(2)
-1.2}
                {1 6.8}
                {2 5.6}
                {3 4.4}
```

2. a. Walker A

Time (s)	Distance (m)
0	0.5
1	2.2
2	3.9
3	5.6
4	7.3
5	9.0
6	10.7

Walker B

Time (s)	Distance (m)
0	4.0
1	3.7
2	3.4
3	3.1
4	2.8
5	2.5
6	2.2

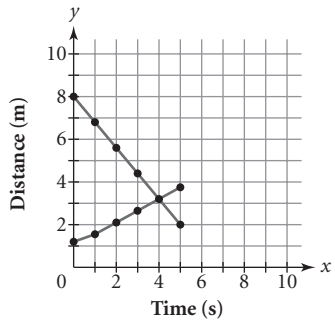
b. Walker A

```
{0,0.5}
                {0 .5}
{Ans(1)+1,Ans(2)
+1.7}
                {1 2.2}
                {2 3.9}
                {3 5.6}
```

Walker B

```
{0,4}
                {0 4}
{Ans(1)+1,Ans(2)
-0.3}
                {1 3.7}
                {2 3.4}
                {3 3.1}
```

3.



The two lines intersect at (4, 3.2). This means that at 4 s, when they are both 3.2 m from the sensor, the two walkers will pass each other going in opposite directions.

4. a. The walker started 1.5 m from the sensor and walked at a constant rate of 0.75 m/s away from the sensor for 6 s.

b. The walker started 5 m from the sensor and walked at a constant rate of 2 m/s toward the sensor for 2 s. Then the walker walked at a constant rate of 1 m/s away from the sensor for 4 s.

LESSON 3.4 • Linear Equations and the Intercept Form

1. a. ii **b.** iv **c.** iii **d.** i

2. a. \$10.35

b. \$18.15

c. The basic handling charge for any package.

d. The cost per pound for a package.

e. 5.5 lb, or 5 lb 8 oz

3. a. −3.4 mi **b.** 2 mi

c. −10 means that the walker started 10 mi away from her destination, if the destination is considered 0.

d. 3 means that the walker walks at a speed of 3 mi/h.

4. a. $x = 0$

b. $x = 9$

5. a. 250 mi

b. 4 h 55 min

LESSON 3.5 • Linear Equations and Rate of Change

1. a. The output values are respectively 18, −9, 27, 1.5, and −4.2.

b. The output values are respectively 5, −1, 7.4, 8.25, and −19.

2. a. 24 mi **b.** about 1.25 h

3. a. Possible; the rate is negative, so the person is walking toward the tree.

b. Not possible; the rate is undefined.

c. Possible; the rate is positive, so the person started at a given distance from the tree and is walking farther away from it.

d. Not possible; there is only one point, so there is no rate.

4. a. i. slope = 2 **ii.** slope = −4 **iii.** slope = −1

b. i. 3 **ii.** 2

iii. −4; *y*-intercept

c. i. $y = 3 + 2x$ **ii.** $y = 2 - 4x$

iii. $y = -4 - x$

d. Lists should match tables.

LESSON 3.6 • Solving Equations Using the Balancing Method

1. a. $x - 1 = 3x - 2$; $x = \frac{1}{2}$

b. $x + 2 = -6$; $x = -8$

c. $1 + x = 2x - 1$; $x = 2$

d. $2x = -3$; $x = -1.5$

2. a. $y = 5 + 2x$, or $y = 2x + 5$

b. $y = -7 + 4x$, or $y = 4x - 7$

c. $y = 17 - \frac{3}{4}x$, or $y = -\frac{3}{4}x + 17$

3. a.

$5 = 2a + 1$	Original equation.
$5 - 1 = 2a + 1 - 1$	Subtract 1 from both sides.
$4 = 2a$	Evaluate and remove the 0.
$\frac{4}{2} = \frac{2a}{2}$	Divide both sides by 2.
$2 = a$, or $a = 2$	Reduce.

b.

$5b - 4 = -20$	Original equation.
$5b - 4 + 4 = -20 + 4$	Add 4 to both sides.
$5b = -16$	Evaluate and remove the 0.
$\frac{5b}{5} = \frac{-16}{5}$	Divide both sides by 5.
$b = \frac{-16}{5}$, or -3.2	Reduce.

c.

$6 + c = 3c - 10$	Original equation.
$6 + c - c = 3c - 10 - c$	Subtract c from both sides.
$6 = 2c - 10$	Simplify and remove the 0.
$6 + 10 = 2c - 10 + 10$	Add 10 to both sides.
$16 = 2c$	Evaluate and remove the 0.
$\frac{16}{2} = \frac{2c}{2}$	Divide both sides by 2.
$8 = c$, or $c = 8$	Reduce.

4. **a.** $\frac{1}{7}$ **b.** 4 **c.** $-\frac{8}{5}$ **d.** $-\frac{1}{36}$

5. **a.** -0.25 **b.** $\frac{5}{8}$ **c.** 36 **d.** $-2z$

6. **a.** $w = 2$ **b.** $v = 3$ **c.** $m = -12$
d. $n = 1.6$ **e.** $x = 0.275$ **f.** $y = -20$

LESSON 4.1 • A Formula for Slope

1. **a.** 3 **b.** $-\frac{1}{3}$, or $-0.\overline{3}$ **c.** Undefined

2. **a.** $\frac{4}{5}$, or 0.8 **b.** $-\frac{5.2}{6.8} = -\frac{13}{17} \approx -0.76$
c. -3 **d.** Undefined

3. Answers will vary; some possible answers:

a. $(0, -1), (6, 3)$ **b.** $(3, 1), (5, 3)$
c. $(1, 8), (9, -2)$ **d.** $(1, 6), (2, 6)$
e. $(-5, -5), (-3, -9)$ **f.** $(1, -8), (15, -2)$

4. **a.** $y = 2 + 1x$, or $y = 1x + 2$
b. $y = 3 - 1x$, or $y = -1x + 3$
c. $y = 2 - 2x$, or $y = -2x + 2$
d. $y = 1 - \frac{1}{4}x$, or $y = -\frac{1}{4}x + 1$

LESSON 4.2 • Writing a Linear Equation to Fit Data

1. Answers will vary.

2. **a.** $y = 3 + 3x$, or $y = 3x + 3$
b. $y = -2 - \frac{1}{2}x$, or $y = -\frac{1}{2}x - 2$
c. $y = -2$

3. **a.** $\frac{11}{5}$ m/s **b.** \$450/wk
c. 60 mi/h **d.** 15 mi/gal

4. **a.** $x = -2$ **b.** $x = -17$ **c.** $x = 4$
d. $x = -7$ **e.** $x = 9$ **f.** $x = -3$
g. $x = 2.2$ **h.** $x = -1.5$ **i.** $x = 0$

LESSON 4.3 • Point-Slope Form of a Linear Equation

1. Point answers may vary; a possible point is given.

a. Slope 2; $(1, 3)$ **b.** Slope $-\frac{3}{4}$; $(-1, -7.4)$
c. Slope $\frac{6}{7}$; $(-5, -4.1)$ **d.** Slope -1; $(2, 0)$

2. **a.** $y = 3 + 2(x - 4)$ **b.** $y = 7 - \frac{2}{3}(x + 6)$
c. $y = 4$

3. **a.** The slope is 1.5 for each pair of points. The points lie on the same line, or are collinear.
b. $y = -10 + 1.5(x + 4)$
c. $y = -5.5 + 1.5(x + 1)$

4. **a.** 2
b–c. The possible equations are $y = 72 + 2(x - 74)$, $y = 76 + 2(x - 76)$, and $y = 80 + 2(x - 78)$.
e. No; no

5. Answers will vary; some possible answers:

$y = 3 + 2(x - 1)$, or $y = 7 + 2(x - 3)$
$y = 7 + 0(x - 3)$, or $y = 7 + 0(x - 5)$, or $y = 7$
$y = 7 - 2(x - 5)$, or $y = 3 - 2(x - 7)$
$y = 3 + 0(x - 1)$, or $y = 3 + 0(x - 7)$, or $y = 3$

LESSON 4.4 • Equivalent Algebraic Equations

1. **a.** Equivalent
b. Not equivalent; $-3x - 6$
c. Not equivalent; $-4x + 9$
d. Equivalent

2. **a.** $y = -7 + 3x$
b. $y = x - 1$
c. $y = -2 - 0.5x$
d. $y = 1 + \frac{1}{3}x$

3. The properties and solutions may vary. Sample answers are:

a.

$3(4x - 2) + 5 = 11$	Original equation.
$12x - 6 + 5 = 11$	Distributive property.
$12x - 1 = 11$	Add $-6 + 5$.
$12x = 12$	Addition property (add 1 to both sides).
$x = 1$	Division property (divide both sides by 12).

b.

$-4(5 + 2x) - 8 = -12$	Original equation.
$-4(5 + 2x) = -4$	Addition property (add 8 to both sides).
$5 + 2x = 1$	Division property (divide both sides by -4).
$2x = -4$	Subtraction property (subtract 5 from both sides).
$x = -2$	Division property (divide both sides by 2).

c.

$6 - 5(3x - 2) = -44$	Original equation.
$6 - 15x + 10 = -44$	Distributive property.
$-15x + 16 = -44$	Add $6 + 10$.
$-15x = -60$	Subtraction property (subtract 16 from both sides).
$x = 4$	Division property (divide both sides by -15).

d.

$-12 + 3(4 - 5x) = 12$	Original equation.
$3(4 - 5x) = 24$	Addition property (add 12 to both sides).
$4 - 5x = 8$	Division property (divide both sides by 3).
$-5x = 4$	Subtraction property (subtract 4 from both sides).
$x = -\frac{4}{5}$, or -0.8	Division property (divide both sides by -5).